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ABSTRACT

The development of the University of Rhode Island's International Engineering Program, particularly the German language instruction component, is described. A committee addressed four questions: (1) whether there is tangible evidence that it is desirable for technologists to learn a second language; (2) why engineers avoid foreign language study; (3) how engineers might be encouraged to study languages, and (4) whether financial or other support was available for the creation of a program to address the issue. The committee's findings are reported, and the development of the program based on these findings is described. The resulting choice of language and of program design elements and decisions are outlined, including separate language instruction for engineers, an internship component, establishment of an advisory board, recruitment, and initial course success. The pilot program is now seen as the core of a larger program to be developed in the future. (MSE)

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LAUNCHING A PROGRAM IN INTERNATIONAL ENGINEERING

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Launching a Program in International Engineering

What do a Kafka researcher and an aerospace engineer have in common? At the University of Rhode Island the answer is a love of the German language, a strong belief that the American educational system must be responsive to national needs, and that traditionally disparate groups in the university structure can and should collaborate. Though these affinities might have lead only to lofty platitudes some years ago, the changing world economy and the new international competitiveness have provided the framework within which cooperation between two such educators is now not only possible but necessary. America leads the world with technological expertise, but falls short when it attempts to communicate its knowledge in the world marketplace. The time has come for the humanist and the technologist to join forces and provide the next generation of students with the tools necessary for productive and rewarding careers in the global workplace.

The aerospace engineer mentioned above is the Dean of the College of Engineering at the University of Rhode Island and the Kafka researcher is both Professor of German and Associate Dean of the College of Arts and Sciences (as well as the author of these pages). The initially casual conversations between these two parties lead to discussions with others in the university community, and to the realization that action would be both appropriate and possible. It was determined that there were several URI engineering faculty with considerable exposure to colleagues and research abroad, and who furthermore strongly believed that we should be training our engineers in foreign languages and intercultural communication. A joint foreign language and engineering committee was commissioned with the task of determining: 1) whether there is tangible evidence that it is desirable for technologists to learn a second language, 2) why engineers avoid foreign language study, 3) how engineers might be encouraged to study languages, and 4) whether one might be able to find support, financial and otherwise, from educational, governmental, and private sources for the creation of a program to address this issue. The following is a summary of this group's findings and an outline of the program which has been designed at the University of Rhode Island in response to these findings.

Why should American engineers be encouraged to study other languages and cultures? The answer to this question rests in the same evidence cited by those who have argued for the internationalization of American business schools. If we are to overcome our failure to compete successfully in the global marketplace, our professionals must be prepared

to meet and deal effectively with counterparts from other cultures and with market conditions throughout the world. Several institutions of higher learning have acted upon the implications of this fact for the marketing expert, the manufacturer, and manager by creating various international business programs. But now it is time to do the same for our engineering programs; we must recognize that more often than not, it is the individual with the technical expertise who is called upon to interact with a counterpart abroad; indeed, the manager or sales representative or manufacturer is often himself a graduate engineer. It is ironic and shortsighted that the American engineer, if judged by his/her undergraduate curriculum, is precisely the person with the least awareness of other cultures and languages.

Why is foreign language study not a part of American engineering education? The answer to this question lies in tradition, in the increasing complexity of modern technology, and in the amount of time allotted to the attainment of an undergraduate degree. Few institutions of higher learning demand high school language courses for admission to their engineering programs, and even fewer require foreign language study in the undergraduate curriculum. The stringent demands of the subject area result in a heavy professional courseload and leave practically no room for elective subjects. Although a small number of engineering programs encourage study abroad, no clear path has emerged for internationalizing that curriculum. Furthermore, with the job market relatively strong, most students are not in search of additional coursework which might provide a competitive edge. Why should one bother with languages and the liberal arts, which are, after all, the subjects left over for those who cannot hack it in the scientific and technical fields?

Is there a solution to this educational dilemma? After wrestling with the apparent reality that most engineering students are not likely to be concerned with the issue and that there is no room for meaningful change within the current curricular format, the Rhode Island committee began to look at more basic change. By extending the undergraduate program one year, it would be possible to incorporate rigorous foreign language and intercultural study as well as an internship abroad into the engineering program, with no sacrifice to the technical subjects. Even though some of our committee doubted that students would opt for this kind of opportunity if an extra year would be required, we concluded that there was no other way. On this basis the University of Rhode Island's five-year International Engineering Program evolved, which is currently in its first developmental year, and will be described in the following.

The International Engineering Program, in its pilot phase, offers students at the University of Rhode Island the opportunity to combine the study of German with their engineering discipline, and to graduate after five years with both the Bachelor of Science and the Bachelor of Arts degrees. This program, which has been funded by a three year $145000 grant from the Fund For the Improvement of Post Secondary Education (U.S. Department of Education), offers separate German courses over a three year period specifically for engineers. In the fourth year students will spend a one semester internship in an engineering firm or research institute in a German speaking country. In the fifth year an interdisciplinary engineering course will be taught to these students in German by bilingual engineering faculty.

Why German? It made sense to limit the program initially to one language for the sake of the clear development of a replicable model. At Rhode Island it also made sense for German to be chosen as the pilot language for several reasons: 1) URI has a German staff committed to teaching German for the professions. 2) URI also is the home of the German Summer School of the Atlantic, a highly successful residential total immersion program subsidized by the Federal Republic of Germany. 3) URI's College of Engineering has several German speaking faculty who are very supportive of the program's goals and active participants in its development. Beyond any in-house reasons for German, however, it is a wise choice for the second language of our graduate engineers in terms of the world economy. The Federal Republic of Germany is one of our most important trading partners and one of the world's leaders in high technology. We have found that several of the over 2000 German based U.S. firms are in our area as well as many Rhode Island manufacturers who do business in Germany. Even though other languages might be an equally sound choice, private enterprise has strongly supported our decision to choose German for our pilot program.

There were several reasons for separating engineering students as a group for foreign language learning: 1) Remaining together maintains the awareness of their common academic and professional goals. 2) It reminds them on an almost daily basis that they are part of an educational experiment, and builds therewith a certain *esprit de corps.* 3) Since they share a major subject area and professional goal, reading material, cultural materials, and general content matter can be oriented to their interests and needs. Even in the first weeks content can be centered on practical daily needs which will face them in Germany; before long drills can be built around mathematics, physics, and chemistry. 4) By isolating the engineers as language learners, arrangements are made simple for bringing in outside speakers to address the topic of international

engineering. What are the differences between American and European engineers, manufacturers, and business persons? How do the attitudes toward technology and business vary? How can Americans become more effective abroad? 5) Keeping the engineers in a group also facilitates our plan to incorporate team teaching into the German classes. Six members of URI's College of Engineering are fluent speakers of German, who have been eager to participate in the program. As the students get to more complex levels of language learning, the engineering faculty become more crucial. It would be naive to assume that the Germanist trained in linguistics and literature will also be versed in the language of machine design, modern electronics, the finite element method, and so on. The language professional must rely on upon his colleague from the professional field for instruction at this level.

A key segment of the IEP is the internship abroad after the Junior year. After a minimum of six semesters of technical and language-culture studies, students are to be sent to a professional, paid internship of four to six months duration with a company or research facility in a German speaking country. The internship is an important educational and motivational element in the entire program; it will provide the student with first-hand exposure to the subject area in industry abroad and will also enable him or her to use and further his/her language and cultural skills in a native context.

The URI committee views the internship as the program's focal point, but also as the largest challenge in the developmental period. Will we find enough positions? Will the students be adequately prepared? Will the myriad of details be manageable without more staff and resources? Fortunately the University of Rhode Island has had experience with sending students on similar internships in the past. Furthermore, we have already established a good working relationship with regional international firms. Through the contacts of the German staff with German based firms and the many contacts which the College of Engineering has in business and industry, we are confident of success.

Because internships depend upon the cooperation of private enterprise, and because the very nature of our program is meant to address the needs of the economy, the committee felt it wise to immediately establish an **Advisory**

Board made up of persons outside of the University. It was reassuring to experience an immediate positive response to our invitations to business persons, and representatives from governmental and educational institutions. Members of the German-American business community have supported us enthusiastically; they have visited us, spoken with our students, invited the students for company tours, agreed to help with internships, and have offered the students summer jobs. We feel as if we have struck a nerve; engineers are not difficult to find and hire, but American engineers with foreign language and intercultural skills are a rarity.

Recruitment of students in the first year. After learning very late in the summer of 1987 that FIPSE would be funding the proposed program, our options for notifying students of the availability of a special beginning German course for engineers were limited. In August we sent out a mailing to all 275 incoming freshmen engineers and to sophomores as well, informing them of the program and providing a return postcard for any interested student. Our committee was very surprised to learn that over eighty students were interested. A quick second mailing with backup registration materials yielded 47 students in two sections of Beginning German for the fall semester. Our committee had anticipated perhaps fifteen students for the first year, and thus was both shocked and delighted with the response.

The first year German course is taught with two overall goals in mind. (1) Since the students who stay with the program will be going to a practical internship in Germany after six semesters of German, they must be prepared to speak the language. For this reason oral skills are stressed from the first day, and given far more attention and weight than in a traditional college German course. (2) Since the internship will also address their professional development, the students must become familiar with the vocabulary of mathematics, physics, computer science, and so forth. There are good materials currently available for this purpose, and it is possible to integrate these subjects, especially math, at a very early stage of language acquisition. The engineering faculty have been helpful in this regard; this German teacher has found that the students' math is already far beyond my own skills.

As we approach the end of the second semester, the initial group of 47 has reduced itself to 30. Some of the students have found that German is more difficult than originally imagined; others have found engineering to be too demanding with the addition of a foreign language. The attrition is natural and to be anticipated; such a program is rigorous and can be appealing, in

the long run, only to the mature and capable student. Our committee assumes that the length of the three-year preparation for an internship is the best selection device for offical participation in the Program. Realistically also, we can not expect to send huge numbers of students to professional internships each year.

Enthusiasm remains high among the students. They have been pleased with the courses, and also with the variety of extracurricular activities provided by the program. There have been two tours of German based companies; there have been several guest lectures by bilingual engineers as well as by practitioners in the field. In addition to language skills the students are beginning to learn the differences in attitudes between our two societies regarding business and engineering. Through the guest speakers and occasional grant sponsored lunches for faculty, guests, and students, it is being continually driven home that they are an important group; they are a part of an educational experiment which could make a substantial difference in their own lives and also to the future of American engineering education. The best sign of the student attitude toward the program is the recent founding of a new student organization on campus, officially sanctioned by the student senate: The Society of Students of International Engineering.

What is the future course of the IEP? Over the three-year period of the FIPSE grant, we expect to have the program fully in place and institutionalized. Challenges for next year will be recruitment of a new incoming class for the beginning course, and planning and preparation for the intermediate course. Our German speaking engineering faculty are also laying plans for the technical courses to be offered in German in the fifth year of the program. The IEP also intends to sponsor an international engineering symposium in order to raise the awareness regarding the problem and our response to it; at least some of the presentations at this meeting will be in German. Finally we are launching an effort to encourage the scientific and technical faculty to consider team teaching General Education courses with some of the liberal arts faculty. Engineering students will find their way to the arts and humanities when they can see the ties of these subject areas to their own fields.

A pleasant by-product of the International Engineering Program is the positive response we have received from several sides. The press has reacted positively, as has the central administration of the university.

Furthermore, through correspondence with prospective engineering students, the College of Engineering is discovering that the IEP is a good recruiting tool. Students can study engineering at any number of schools, but other institutions do not offer engineers the opportunity of international education. Students in our program are sold on the fact that they will have an entirely new dimension to their education, which will not only enrichen their lives, but also create new and exciting career opportunities for them.

Inasmuch as the current International Engineering Program is a pilot program, which is intended to serve as a replicable model, our committee sees the current plan as the core of a larger future program. Given URI's strength in French and the presence of French-English bilingual engineering faculty, this language and culture will be the basis of our first expansion of the IEP. We are often asked why we have not chosen Japanese as the first language for our program. Although modern society might point us in this direction, we knew that neither the language department nor the engineering departments had the staff or contacts to develop in this area. We hope that our model might provide the impetus for another university to found a parallel program with Japanese as the language, just as a university in the Southwest might use Spanish as the language.

Our experience at Rhode Island has convinced us that internationalism cuts across all disciplines today and provides a common ground for discussion and action. For years the foreign language professional has argued that all Americans should be versed in a second language; yet it is typical of the pragmatic American mind not to respond without a concrete reason. And those reasons are there today; the American economy has lost its competitive edge in part because of our ignorance about the needs and wishes of the rest of the world. While some would attempt to legislate our way to a positive balance of payments, and indeed would try to force other societies to buy our goods, the only lasting solution to this problem lies in our American ability to grasp the issue and come forward with workable solutions. We educators must accept the challenge and prepare our students for the global society which we acknowledge.

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